No. 8900206

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Kansas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen** YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS REQUIRED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'2158'

AMENDED CERTIFICATE

*Original grant May 31, 1990.

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D. C. *this* 29th *day of* March *in the year of our Lord one thousand nine hundred and* ninety-one.

Attest:

Kenneth H. Evans

Commissioner

Plant Variety Protection Office

Agricultural Marketing Service

Ed Madigan

Secretary of Agriculture

APPROVAL EXPIRES 2-28-88

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)
KANSAS AGRICULTURAL EXPERIMENT STATION
~~PIONEER HI-BRED INTERNATIONAL, INC.~~

2. TEMPORARY DESIGNATION
XW171

3. VARIETY NAME
2158

4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)*
~~Plant Breeding Division~~
WATERS HALL, KANSAS STATE UNIVERSITY
~~Dept. of Cereal Seed Breeding~~
~~7301 N.W. 62nd Ave., P.O. Box 85~~
MANHATTAN, KS 66506-4008
~~Johnston, Iowa 50131-0085~~

5. PHONE *(Include area code)*
(913) 532-6147

FOR OFFICIAL USE ONLY

PVPO NUMBER
8900206

6. GENUS AND SPECIES NAME
Triticum aestivum L.

7. FAMILY NAME *(Botanical)*
GRAMINEAE

FILING
DATE: May 9, 1989
TIME: 1145 ☑ A.M. ☐ P.M.

8. KIND NAME
WHEAT

9. DATE OF DETERMINATION
December 1, 1988

FEES RECEIVED
AMOUNT FOR FILING
$ 1800.00 + 350.00
DATE: May 9, 1989. June 5, 1989
AMOUNT FOR CERTIFICATE
$ 250
DATE: May 3, 1990

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
CORPORATION

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
IOWA

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
~~DR. MARK IWIG~~
~~PIONEER HI-BRED, INT., INC.~~
~~7301 N.W. 62nd Ave., P.O. Box 85~~
~~Johnston, Iowa 50131-0085~~
VERNON A. SCHAFFER
DEPARTMENT OF AGRONOMY
THROCKMORTON HALL
KANSAS STATE UNIVERSITY
MANHATTAN, KS 66506-5501
PHONE *(Include area code)*: (913) 532-6115 ~~1-515-270-3311~~

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED
- a. ☒ Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
- b. ☒ Exhibit B, Novelty Statement.
- c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
- d. ☒ Exhibit D, Additional Description of Variety.
- e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)* ☒ Yes *(If "Yes," answer items 16 and 17 below)* ☒ No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☒ Yes ☐ No

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☒ Foundation ☒ Registered ☒ Certified

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
☐ Yes *(If "Yes," give date)*
☒ No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES ?
☐ Yes *(If "Yes," give names of countries and dates)*
☒ No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT	DATE
x Mark M. Iwig	5/1/89
SIGNATURE OF APPLICANT	DATE

FORM LS-470 (3-86) *Edition of 7-84 obsolete.*

14A. Exhibit A, Origin and Breeding History of the Variety.

Pioneer cultivar '2158' ~~XW171~~ is a common hard red winter wheat (Triticum aestivum L.) developed by Pioneer Hi-Bred International, Inc., from the cross of Caprock/4/Etoile de Choisy//Thorne/Clarkan/3/CI13390/5/SC3213. A semi-dwarf mutant was selected from the Etoile de Choisy//Thorne/Clarkan cross. This mutant was crossed to CI13390. A pure-line selection from this cross was crossed to Caprock. This single-cross was then crossed to SC3213. SC3213 is a pure-line resulting from a Sturdy out-cross.

The F1 generation was grown in the greenhouse at Hutchinson, KS in 1971. Single F2 plants were selected in 1973 and the bulked seed of each plant was advanced in the field at Hutchinson in 1974. Subsequent bulks were grown in the field in Kansas until 1980 when heads were selected from the F9 bulks. These heads were planted to row in 1981, and one F9-derived row was bulk-harvested and planted as a progeny plot in 1982 at Altus, OK. Breeder purification was at Vernon, TX in 1985 (100 headrows, with off-types discarded) and in 1987 (1,000 headrows, with off-types discarded).

'2158' ~~XW171~~ has been in yield tests and milling and baking trials since 1983.

'2158'

~~XW171~~ has demonstrated uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety", except for an occasional variant for plant height. Under the environments grown, 1 plant in approximately 5,000 will have a secondary tiller in which peduncle elongation is 4-6 cm longer than other tillers; all other traits of these taller tillers are identical phenotypically to the normal-height tillers.

14B. Exhibit B, Novelty Statement

'2158'
~~XW171~~ is an awned semi-dwarf hard red winter wheat cultivar most similar to the cultivar Pioneer 2157 in many phenotypic and agronomic traits. '2158' ~~XW171~~ is uniquely different from Pioneer 2157 in plant color at booting, waxy bloom, glume length, glume width, and juvenile plant growth habit.

'2158'
~~XW171~~ has green plant color at booting (2157 is blue-green), waxy bloom is absent (2157 has it present), has long glumes (2157 has short glumes), has wide glumes (2157 has narrow glumes), and has a prostrate juvenile plant growth habit (2157 is semi-erect in juvenile plant growth habit).

FORM APPROVED: OMB NO. 40-R3822

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)

PIONEER HI-BRED INTERNATIONAL, INC.

ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*)

PLANT BREEDING DIVISION
DEPARTMENT OF CEREAL SEED BREEDING
7301 N.W. 62ND AVE., P.O. BOX 85
JOHNSTON, IOWA 50131-0085

FOR OFFICIAL USE ONLY

PVPO NUMBER 8900206

VARIETY NAME OR TEMPORARY DESIGNATION

XW171-temporary designation
2158

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:

[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

[2] 1 = SPRING 2 = WINTER 3 = OTHER (*Specify*) _____ [2] 1 = SOFT 2 = HARD 3 = OTHER (*Specify*) _____

[2] 1 = WHITE 2 = RED 3 = OTHER (*Specify*) _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

[2][3][1] FIRST FLOWERING [2][3][8] LAST FLOWERING

4. MATURITY (*50% Flowering*):

[0][4] NO. OF DAYS *EARLIER* THAN [2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS

[ ][ ] NO. OF DAYS *LATER* THAN [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (*From soil level to top of head*):

[1][0][1] CM. HIGH

[ ][ ] CM. TALLER THAN [ ]

[1][9] CM. SHORTER THAN [2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (*See reverse*):

[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:

[1] 1 = YELLOW 2 = PURPLE

8. STEM:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT

[0][4] NO. OF NODES (*Originating from node above ground*)

[1] Waxy bloom: 1 = ABSENT 2 = PRESENT

[1] Internodes: 1 = HOLLOW 2 = SOLID

[1][9] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

[1] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (*Specify*): _____

[2] Flag leaf: 1 = NOT TWISTED 2 = TWISTED

[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT

[2] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT

[1][1] MM. LEAF WIDTH (*First leaf below flag leaf*)

[1][7] CM. LEAF LENGTH (*First leaf below flag leaf*):

8900206

11. HEAD:

[1] Density: 1 = LAX 2 = DENSE

[4] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) Fusiform

[4] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[1] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify): _____

[0][9] CM. LENGTH

[1][0] MM. WIDTH

12. GLUMES AT MATURITY:

[3] Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)

[3] Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

[4] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[3] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[1] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[1] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[3] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[2] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[3] Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

[0][7] MM. LENGTH

[0][3] MM. WIDTH

[2][9] GM. PER 1000 SEEDS

17. SEED CREASE:

[1] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[1] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[1] STEM RUST (Races) 15-TNM

[2] LEAF RUST (Races) UN5, UN13

[0] STRIPE RUST (Races) _____

[0] LOOSE SMUT

[1] POWDERY MILDEW

[0] BUNT

[2] OTHER (Specify) Soil-Borne Mosaic Virus

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY

[0] APHID (Bydv.)

[1] GREEN BUG

[0] CEREAL LEAF BEETLE

[0] OTHER (Specify) _____

HESSIAN FLY RACES:

[2] GP [2] A [2] B [2] C

[0] D [0] E [0] F [0] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Pioneer 2180	Seed size	Pioneer 2165
Leaf size	Pioneer 2165	Seed shape	Pioneer 2165
Leaf color	Pioneer 2165	Coleoptile elongation	Pioneer 2157
Leaf carriage	Pioneer 2165	Seedling pigmentation	Pioneer 2165

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

14D. Additional Description of the Variety.

2158
~~XW171~~ is a common hard red winter wheat, Triticum aestivum L.

Flowering date is 4 days earlier than the variety Scout and 1 day later than Pioneer 2157. The plant height has averaged 101 cm, about 19 cm shorter than Scout and 2 cm taller than Pioneer 2157.

The plant color at booting stage is green.

Anther color is yellow, similar to Pioneer 2157 and Newton.

Anthocyanin has been absent in the stem. A waxy bloom is absent on the stem. Stem internodes are hollow. No hairiness exists on the last internode of the rachis. Normally 4 stem nodes are present above ground. Internode length between flag leaf and leaf below is about 19 cm when measured in the field at Vernon, TX.

Auricles lack both anthocyanin and hairiness.

Flag leaves are generally erect at booting and tend to be twisted. Hairs are absent on the first leaf sheath. There is a waxy bloom on the flag leaf sheath. The first leaf below the flag leaf averages about 11 mm wide and 17 cm long when measured in the field at Vernon, TX.

Spikes are generally lax, fusiform, awned and white at maturity, with awns being rough and about 4 to 6 cm in length. Spike length averages 9 cm and spike width averages 10 mm wide. However, spike width and length are variable with plant population and level of production.

The glumes are long and wide generally, having square shoulders, with acuminate beaks.

When evaluated at Vernon, TX, coleoptile color is white and seedling anthocyanin is absent.

Juvenile plant growth is prostrate, similar to TAM 105.

Kernels are red in color, elliptical in shape, with rounded cheeks and a shallow crease. The brush is medium in size. Kernels average 7 mm long and 3 mm wide and weigh about 29 g per 1000.

EJ 9/3/92

'2158'
~~XW171~~ is moderately resistant to soil-borne mosaic virus and the predominant local races of leaf rust (Puccinia recondita f. sp. tritici), moderately susceptible to predominant local races of stem rust (Puccinia graminis f. sp. tritici) and stripe rust (Puccinia striiformis), and susceptible to powdery mildew (Erysiphe graminis f. sp. tritici). It has not been tested for reaction to loose smut or bunt.

'2158'
~~XW171~~ is resistant to the Hessian fly races GP, A, B, and C based on tests run at Kansas State University with Dr. James Hatchett. These results suggest that it carries the genes H3 and H6. It is susceptible to greenbug biotypes C and E, but Pioneer lab screening tests show it has some tolerance (delayed damage) compared to other current hard red winter cultivars. It has not been tested for resistance to sawfly or cereal leaf bettle.

'2158'
~~XW171~~ has a good yield record when compared with currently grown hard red winter wheat cultivars. Several years of Pioneer yield test results in the U.S. hard red winter wheat region are summarized in Table 1 below.

'2158'
~~XW171~~ has agronomic traits suitable for the U.S. hard red winter wheat region. A summary of several years of Pioneer observation of agronomic traits is presented below in Table 2.

'2158'
~~XW171~~ has good hard red winter wheat quality characteristics, similar to Pioneer 2157. A summary of several years of milling and baking performance in the Pioneer Quality Lab at Hutchinson, KS, is presented below in Table 3.

Table 1. Comparative yields of XW171 with several commercial hard red winter wheat cultivars, 1986-1988.

Cultivar	Yield (bu/acre) Oklahoma Region(a)	TX/OK Panhandles(b)
'2158' ~~XW171~~	48.1	54.6
Pioneer 2157	44.1 *	52.3 *
Pioneer 2180	46.1	49.5 *
TAM 105	37.3 *	52.9 *
Mustang	42.7 *	54.1
Siouxland	45.6	49.5 *
Vona	41.1 *	50.9

a- 20 reps over 9 environments in Pioneer tests.
b- 28 reps over 12 environments in Pioneer tests.

*- Significantly Different from XW171 at 5% level.

Table 2. Agronomic traits of XW171 compared with Pioneer 2157 for three traits.[1]

Trait	~~XW171~~ 2158	Pioneer 2157	Sig. Diff. at 5% Level	No. of Reps
Stalk Lodging	4.4	7.1	Yes	7
Leaf Rust	7.1	6.1	Yes	27
Plant height, inches	30.4	29.6	Yes	13

[1] Data collected from Pioneer yield plots in Oklahoma and Texas during 1986-1988. Scores are on a basis of 1=poor, 9=superior.

Table 3. Comparative Quality Traits of XW171 with other hard red cultivars, 1984-1988.[1]

Cultivar	%Flour Yield	%Flour Protein	Mix Time	Mix Tolerance	Loaf Volume
'2158' ~~XW171~~	68.6	13.0	3.6	2.5	71.7
Pioneer 2157	69.6 *	13.0	3.6	3.4 *	68.6
TAM 105	67.0 *	11.5 *	3.2 *	3.6 *	67.0 *
# of reps	16	16	16	16	7

[1] Data collected at Pioneer Quality Lab, Hutchinson, KS from plots grown in Oklahoma and Texas.

*- Significantly Different from XW171 at 5% level.

14E. Statement of the Basis of Applicant's Ownership.

Pioneer Hi-Bred International, Inc., Plant Breeding Division, believes it is the sole, original and first breeder of ~~XW171~~ '2158' cultivar of hard red winter wheat for which it solicits a certification of protection.